This listing of claims represents the claims as previously presented:

Listing of Claims:

Claims 1-25 (cancelled)

26. (currently amended) A method of compositional analysis of a heterogeneous material of one or more components, comprising ~~the steps of~~:

(a) directing a pulse of laser radiation at a target of the heterogeneous material to ablate an amount thereof, and to form an ablation crater having a depth;

(b) determining the concentration of one or more selected components in the heterogeneous material ablated from the target;

(c) measuring in situ the depth of the ablation crater other than in dependence upon time gated imaging data of the directed pulse of laser radiation, and

(d) determining a composition of the heterogeneous material at the depth.

27. (currently amended) A method according to claim 26, wherein ~~the step of~~ measuring the depth is performed based on sensing of a beam of light directed at the target and other than the pulse of laser radiation.

28. (currently amended) A method according to claim 26, wherein at least one of ~~steps~~ (a) to (d) is repeated for determining a compositional profile of the heterogeneous material as a function of the depth.

29. (currently amended) A method according to claim 28, further comprising ~~the steps of~~:

(e) shifting a target to a each of a plurality of locations across the heterogeneous material, and

(f) repeating steps (a) to (e).

30. (currently amended) A method according to claim 29 comprising ~~the steps of~~ determining a compositional profile of the heterogeneous material in three dimensions.

31. (currently amended) A method according to claim 28, wherein ~~the step of~~ measuring the depth of the ablation crater further comprises ~~a steps of~~:

(g) measuring the depth of the ablation crater at each of a plurality of points thereacross; and

(h) generating a depth profile of the ablation crater.

32. (currently amended) A method according to claim 31, further comprising ~~the steps of~~:

(h) repeating step (h) at a plurality of depths of the ablation crater; and

(i) generating an evolution of the depth profile of the ablation crater.

33. (currently amended) A method according to claim 29, wherein ~~the step of~~ measuring the depth of the ablation crater further comprises ~~a step of~~:

(j) measuring the depth of the ablation crater at each of a plurality of points thereacross for each of a plurality of ablation craters; and

(k) generating a compositional profile of the heterogeneous material in three

dimensions.

34. (currently amended) A method according to claim 28, further comprising ~~a step of~~ processing data from steps (a) to (d) to align one with another spatially for forming the compositional profile of the heterogeneous material as a function of the depth.

35. (currently amended) A method according to claim 29, further comprising ~~a step of~~ processing data from steps (a) to (d) to align one with another spatially for forming the compositional profile of the heterogeneous material as a function of the depth.

36. (previously presented) A method according to claim 26, wherein the concentration is determined by a spectrochemical analysis technique selected from a group consisting of: optical emission spectrometry of the light emitted by the plasma produced above the target concomitantly with the laser ablative event; optical emission spectrometry, following the introduction of the material ablated from the target into an auxiliary plasma discharge where said material is excited to emit light; and mass spectrometry of said material ablated from the target, following the introduction of the ablated material into said auxiliary plasma discharge, from which the ablated material is extracted in ionized form.

37. (currently amended) A method according to claim 26, wherein ~~the step of~~ measuring the depth is performed by a technique selected from a group consisting of: confocal microscopy, laser triangulation, and interferometry using a short coherence length light source.

38. (currently amended) A method according to claim 37, wherein ~~the step of~~ measuring the depth comprises ~~the steps of~~:

directing a beam of short coherence length light toward both the ablation crater and an interferometric mirror; and

measuring interference between light reflected from the ablation crater and reflected from the interferometric mirror.

39. (currently amended) A method according to claim 38, comprising ~~steps of~~:

directing a beam of short coherence length light toward both another location within the ablation crater and the interferometric mirror;

measuring interference between light reflected from the other location within the ablation crater and reflected from the interferometric mirror; and

generating a depth profile of the ablation crater.

40. (currently amended) A method according to claim 37, further comprising ~~the steps of~~:

directing a beam of short coherence length light toward a surface inside the ablation crater, a surface outside the ablation crater and an interferometric mirror, and

measuring interference between light reflected from the surface inside the ablation crater and the interferometric mirror and between light reflected from the surface outside the ablation crater and the interferometric mirror.

41. (previously presented) A method according to claim 38 wherein the short coherence light propagates colinearly with the laser radiation.

42. (previously presented) A method according to claim 38 wherein the short coherence light propagates at an angle to the direction of the laser radiation.

43. (previously presented) An apparatus for compositional analysis of a heterogeneous material of one or more components, comprising:

a laser source for producing an ablation beam of laser pulses of sufficient fluence to ablate an amount of the heterogeneous material from a target under study and thereby to form an ablation crater of a depth;

a spectrometric device for detecting and determining the concentration of one or more selected components in the heterogeneous material ablated from the target; and,

an optical device for measuring in situ the depth of the ablation crater using other than time gated imaging.

44. (previously presented) An apparatus according to claim 43, wherein said optical device comprises a light source for directing light at the heterogeneous material and a sensor for sensing the light from the light source.

45. (previously presented) An apparatus according to claim 43, wherein said spectrometric device is selected from a group consisting of: an optical spectrometric device for a spectrochemic analysis using light emitted by plasma produced above the target concomitantly with the laser ablative event; an optical spectrometric device for a spectrochemic analysis using light emitted by an auxiliary plasma discharge into which the material ablated from the target is introduced; and a mass spectrometer for determining the concentration of one or more selected components in the material ablated from the target and subsequently ionized.

46. (previously presented) An apparatus according to claim 43, wherein the optical device for measuring the depth of the ablation crater is selected from a group consisting of a confocal microscopy device, a laser triangulation device, and an interferometer relying on a short coherence length light source.

47. (previously presented) An apparatus according to claim 43, comprising a mechanical device for scanning a beam of the optical device across the target for measuring the depth of the ablation crater.

48. (previously presented) An apparatus according to claim 43, comprising an actuator for effecting relative motion between the beam of the optical device and the target.

49. (previously presented) An apparatus according to claim 43, wherein the optical device for measuring the depth of the ablation crater comprises a dual measuring beam system for simultaneous measurement of depth at two points on the sample surface.

50. (previously presented) An apparatus according to claim 43, wherein the optical device for measuring the depth of the ablation crater comprises a dual measuring beam system for simultaneous measurement of depth at two points on the sample surface simultaneously, one proximate a point where the laser source directs a beam at an instance of time and another in a region substantially unaffected by the ablation beam and residual debris at the instant of time.

51. (previously presented) An apparatus according to claim 43, comprising a dichroic plate disposed for receiving the ablation beam and a beam from the optical device for superimposing them so as to be substantially collinear in use.

52. (previously presented) An apparatus according to claim 43, wherein said optical device is disposed relative to the laser source for providing a beam forming an angle relative to the ablation beam.

53. (previously presented) An apparatus according to claim 43, comprising means for generating the ablation beam of substantially uniform radial distribution of energy, thus producing a crater with flat bottom and steep walls.

54. (previously presented) An apparatus according to claim 43, comprising an aperture disposed for having the ablation beam pass therethrough for resulting in an ablation beam of substantially uniform radial distribution of energy.

55. (previously presented) An apparatus according to claim 43, comprising a data

processor for processing data from the spectrometric device and the optical device to correlate data provided by each.

56. (previously presented) An apparatus according to claim 43, comprising a data processor for processing data from the spectrometric device and the optical device to correlate data provided by each for spatially orienting a plurality of data one relative to another.

57. (previously presented) An apparatus for compositional analysis of a heterogeneous material of one or more components, comprising:

a laser source for producing an ablation beam of laser pulses of sufficient fluence to ablate an amount of the heterogeneous material from a target under study and thereby to form an ablation crater of a depth;

a spectrometric device for detecting and determining the concentration of one or more selected components in the heterogeneous material ablated from the target;

a light source for directing light at the heterogeneous material;

a sensor for in situ sensing of the light from the light source and for providing sensor data; and

a processor for determining the depth of the ablation crater in dependence upon the sensed data.